



User Instructions

Valtek Mark One K-Bellows Sealed Globe Valves

Hydroformed metal bellows seal for extended service life

FCD VLAIM0065-00 01/06

***Installation
Operation
Maintenance***



Experience In Motion

1. GENERAL INFORMATION

1.1 Using

The following instructions are designed to assist in disassembling, reassembling and troubleshooting Valtek valves equipped with a K-Bellows metal bellows seal. Product users and maintenance personnel should thoroughly review this bulletin in conjunction with Maintenance Instructions 1 (Mark One and Two Control Valves) before installing, operating or performing any maintenance on the valve. This publication does not contain information on Valtek positioners. Refer to the appropriate Maintenance Instructions for installing, maintaining, troubleshooting, calibrating, and operating Valtek positioners. In most cases Flowserve valves, actuators and accessories are designed for specific applications (e.g. with regard to medium, pressure, temperature). For this reason they should not be used in other applications without first contacting the manufacturer.

1.2 Applicability

The following instructions are applicable to the maintenance and installation of K-Bellows only. This document should be used in conjunction with the appropriate Installation, Operation and Maintenance Instructions specific to the model valve on which the bellows is installed.

1.3 Terms Concerning Safety

The safety terms DANGER, WARNING, CAUTION and NOTE are used in these instructions to highlight particular dangers and/or to provide additional information on aspects that may not be readily apparent.



DANGER: indicates that death, severe personal injury and/or substantial property damage will occur if proper precautions are not taken.



WARNING: indicates that death, severe personal injury and/or substantial property damage can occur if proper precautions are not taken.



CAUTION: indicates that minor personal injury and/ or property damage can occur if proper precautions are not taken.



NOTE: indicates and provides additional technical information, which may not be very obvious even to qualified personnel. Compliance with other, not particularly emphasized notes, with regard to transport, assembly, operation and maintenance and with regard to technical documentation (e.g. in the operating instruction, product documentation or on the product itself) is essential, in order to avoid faults, which in themselves might directly, or indirectly cause severe personal injury or property damage.

1.4 Protective Clothing

FLOWSERVE products are often used in problematic applications (e.g. extremely high pressures, dangerous, toxic or corrosive mediums). In particular, valves with bellows seals point to such applications. When performing service, inspection or repair operations always ensure, that the valve and actuator are depressurized and that the valve has been cleaned and is free from harmful substances. In such cases pay particular attention to personal protection (protective clothing, gloves, glasses and respirator as required).

1.5 Qualified Personnel

Qualified personnel are people who, on account of their training, experience and instruction and their knowledge of relevant standards, specifications, accident prevention regulations and operating conditions, have been authorized by those responsible for the safety of the plant to perform the necessary work and who can recognize and avoid possible dangers.

1.6 Installation



DANGER: Before installation check the order-no, serial-no. and/or the tag-no. to ensure that the valve/ actuator is correct for the intended application. Special care should be taken to not exceed the pressure rating of bellows which may be lower than the pressure class of the valve.

1. Do not insulate extensions that are provided for hot or cold services.
2. Pipelines must be correctly aligned to ensure that the valve is not fitted under tension.


3. The user must provide fire protection.

1.7 Spare Parts

Use only FLOWSERVE original spare parts. FLOWSERVE cannot accept responsibility for any damages that occur from using spare parts or fastening materials from other manufactures. If FLOWSERVE products (especially sealing materials) have been on store for longer periods check these for corrosion or deterioration before using these products. The end user must provide fire protection for FLOWSERVE products.

1.8 Service / Repair

To avoid possible injury to personnel or damage to products, safety terms must be strictly adhered to. Modifying this product, substituting non-factory parts, or using maintenance procedures other than outlined in this instruction could drastically affect performance and be hazardous to personnel and equipment, and may void existing warranties. Between actuator and valve there are moving parts. To avoid injury FLOWSERVE provides pinch-point-protection in the form of cover plates, especially where side-mounted positioners are fitted. If these plates are removed for inspection, service or repair special attention is required. After completing work the cover plates must be refitted. Apart from the operating instructions and the obligatory accident prevention directives valid in the country of use, all recognized regulations for safety and good engineering practices must be followed.

 **WARNING:** Before products are returned to FLOWSERVE for repair or service Flowserve must be provided with an MSDS (Material Safety Data Sheet) and a certificate, which confirms that the product has been decontaminated, and is clean. Flowserve will not accept deliveries if the MSDS and certificate have not been provided (a form can be obtained from Flowserve). Valve packing should be removed and the packing area flushed as part of the cleaning.

1.9 Storage

In most cases Flowserve products are manufactured from stainless steel. Products not manufactured from stainless steel are provided with an epoxy resin coating. This means that


Flowserve products are well protected from corrosion. Nevertheless Flowserve products must be stored adequately in a clean, dry environment. Plastic caps are fitted to protect the flange faces to prevent the ingress of foreign materials. These caps should not be removed until the valve is actually mounted into the system.


1.10 Product Variations

These instructions cannot claim to cover all details of all possible product variations, nor in particular can they provide information for every possible example of installation, operation or maintenance. This means that the instructions normally include only the directions to be followed by qualified personal where the product is being used for is defined purpose. If there are any uncertainties in this respect particularly in the event of missing product-related information, clarification must be obtained via the appropriate Flowserve sales office.

2. DISSASSEMBLY OF K-BELLOWS VALVES

To disassemble the K-Bellows valve, refer to Figure 1 and proceed as follows:

 **WARNING:** Since toxic or hazardous materials may be present, depressurize the line to atmospheric pressure. Drain all process fluids and decontaminate the valve. Failure to do so can cause serious personal injury. Keep hands, hair and clothing away from moving valve parts at all times. Face and eye protection should be worn; otherwise, serious personal injury may occur.

 **WARNING:** The tell-tale tap should be removed before disassembly and the bellows checked for failure. If failure of the bellows has occurred, extreme care should be taken to avoid personal injury.

2.1 Remove the actuator by removing first the packing gland bolting and then the yoke clamp bolting. Loosen the stem clamp nut on the actuator stem. For air to open valves, stroke the valve open to prevent damage to the seat surfaces and to remove pressure from the

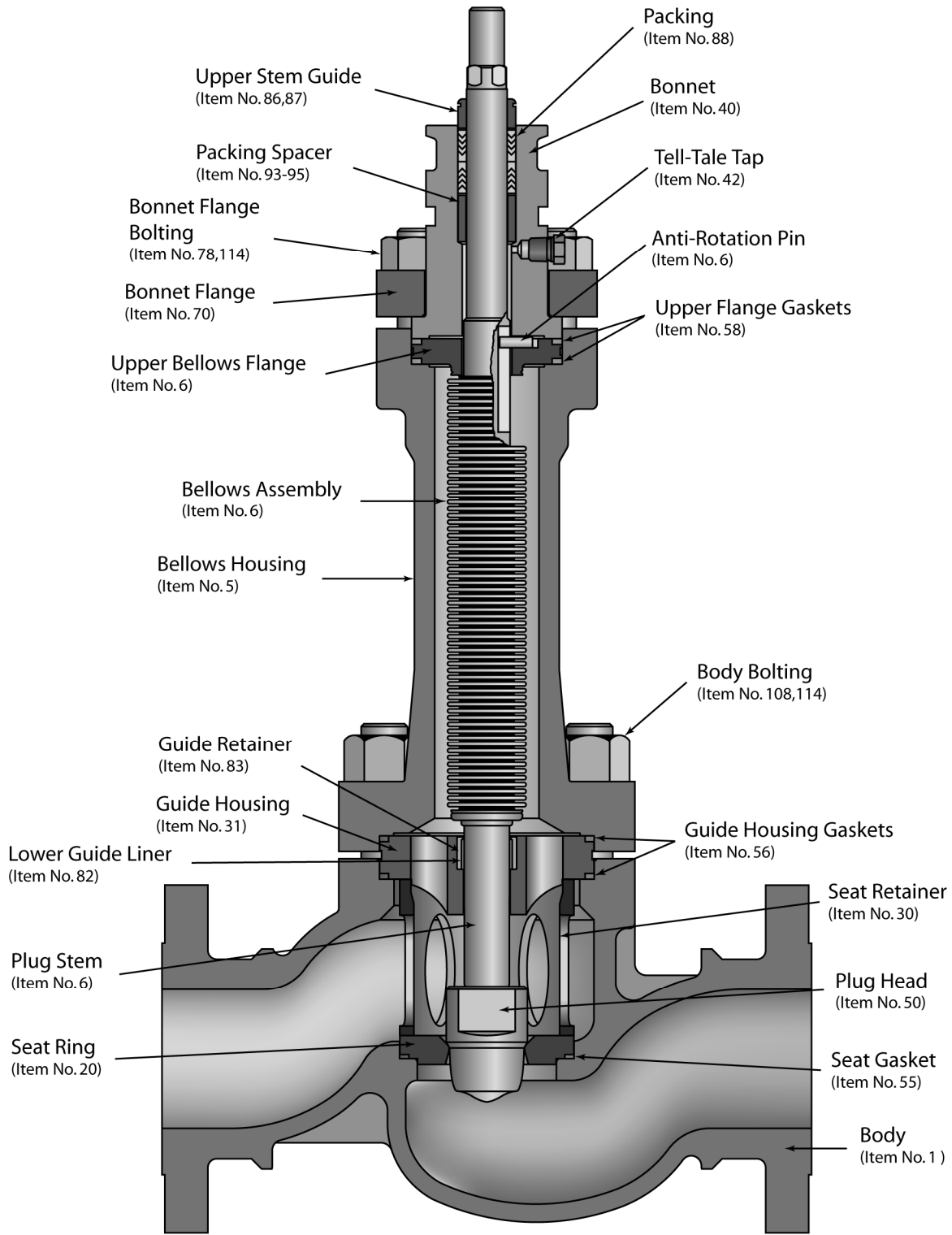




Figure 1: Mark One with K-Bellows


Note: Item numbers correspond directly to the valve's bill of material.

bolting. Once the yoke clamps are off remove the air from the actuator. This will cause the yoke and bonnet to separate. Hold the plug stem with a wrench and turn the actuator counter clockwise until it is free. Take care not to turn the plug stem as this will damage the bellows.

 **CAUTION:** Although the valve incorporates an anti-rotation pin, care should be taken not to put excessive torque on the plug stem/bellows assembly. Excessive torque can damage bellows and/or shear the anti-rotation pin.

 **NOTE:** Heavy assemblies may require a hoist. A lifting ring is provided on most actuators for this purpose; otherwise, lift by the yoke legs using lifting straps and a hoist.

2.2 Loosen and remove the bonnet flange bolting. Remove the bonnet, and anti-rotation pin. The anti-rotation pin is small and often becomes lost at this point. Find a place for the pin where it will not be lost before reassembly.

 **WARNING:** If there has been a bellows failure, process fluids may be trapped in the packing box; therefore, be extremely cautious when removing the packing box bolting and packing.

2.3 Remove the upper stem guide, packing and packing spacer from the bonnet.

2.4 Loosen and remove body bolting nuts. Leave the body studs in the body unless they need to be removed.

2.5 Remove the entire bellows seal assembly and bellows housing by lifting them straight out of the body.

 **NOTE:** Heavy bellows assemblies may require a hoist. Use lifting straps or lifting rings as needed.


2.6 Place the bellows assembly of the valve in a safe working location or on the bench, taking care to protect the seating surfaces on the plug.


2.7 Remove the seat retainer, seat ring, and seat gasket from the body.

2.8 Carefully grind off the tack weld between the plug head and the plug stem. Using the flats on the plug head and the stem, remove the plug head from the stem, taking care not to damage the seating surfaces of the plug head.

2.6 Remove the guide housing, bellows housing and gaskets from the bellows assembly.

2.7 The lower guides are held in place by with a press fit. If the guide liner is damaged or worn, machine out the retainer and replace the guide liner and retainer. When the valve is equipped with PTFE guide liners, the liner can be removed by deforming the PTFE without removing the retainer from the housing.

 **WARNING:** The lower guides are exposed to process fluid and fluid may still be trapped into the voids in this area. Be extremely cautious while removing the lower guides.

 **NOTE:** The bellows assembly should not be taken apart. If the bellows has failed, the entire cartridge should be replaced.

3. REASSEMBLY OF K-BELLOWS VALVES

To reassemble the K-Bellows valve, refer to Figure 1 and proceed as follows:

3.1 Check metal bellows for signs of wear or damage. If the bellows shows signs of fatigue or cracking, obtain a replacement before reassembling and operating the valve. Make sure all gasket surfaces are clean and free of damage.

3.2 Replace the lower upper flange gasket and insert the bellows assembly into the bellows housing.

3.3 Place the top upper flange gasket onto the upper bellows flange. Replace the anti-rotation pin, bonnet, bonnet flange and bonnet flange bolting. Take care not to scratch the plug stem during assembly. Keep the bonnet flange bolting loose at this point. Align the bonnet so that the tell-tale port faces the back of the valve, opposite the positioner.


3.4 If the packing has been removed, replace packing spacer, packing and upper stem guide (refer to Figure 1).


3.5 Inspect the lower guides for wear or damage. The lower guides are held in place by with a press fit. If the guide liner is damaged or worn, machine out the retainer and replace the guide liner and retainer.

3.5.1 When the valve is equipped with PTFE guide liners, the liner can be removed by deforming the PTFE without removing the retainer from the housing. Once the liner is removed, cut the new liner straight up the side. This will allow the liner to be rolled onto itself and installed into the guide retainer while the retainer is still in the housing. Once the liner is in place it will spring back into place.

3.6 Place the upper guide housing gasket and then the guide housing onto the plug stem.


3.7 Reattach the plug head by screwing it onto the plug stem. Do not use anti-seize on the plug head to plug stem threads. Use a small tack weld to keep the plug head from turning off the plug stem.

 **CAUTION:** Although the valve incorporates an anti-rotation pin, care should be taken not to put excessive torque on the plug stem/bellows assembly. Excessive torque can damage bellows and/or shear the anti-rotation pin.

 **NOTE:** Many K-bellows valves use alloy materials for the materials of construction. Be careful to match the correct weld rod with the plug head and stem material before tack welding them together.

3.8 Replace the seat gasket, seat ring, seat retainer, lower guide housing gasket into the body. Make sure the seat ring spins freely to assure proper installation.

3.9 Lower the bellows assembly straight down into the body taking care not to damage the seating surfaces on the plug and seat ring.


 **WARNING:** Care should be taken not to damage the bellows or plug and seat ring seating surfaces when installing the bellows. Damage to the bellows may cause faulty operation and/or injury to personnel.


3.10 Assemble and tighten the body bolting to finger tight.

3.11 Place the gland flange over the plug stem and the stem clamp on the actuator stem and reinstall the actuator assembly by screwing it onto the plug stem. Hold the plug stem from turning using the flats on the stem and a wrench.

3.11.1 On air-to-open valves, screw the actuator down until there is a 1/32 to 1/16" gap between the yoke and the bonnet. This should leave three or four plug stem threads exposed below the actuator stem to ensure proper seating.

3.11.2 For correct plug engagement on air-to open valves, make certain the plug does not rotate in the body/bonnet assembly and screw the actuator assembly onto the plug as far as possible.

 **CAUTION:** Although the valve incorporates an anti-rotation pin, care should be taken not to put excessive torque on the plug stem/bellows assembly. Excessive torque can damage bellows and/or shear the anti-rotation pin.

 **WARNING:** Rotation of the plug while clamped in the body/bonnet assembly will damage the bellows seal, which could cause personal injury.

3.12 Apply air pressure above the piston to drive it to the bottom of the actuator cylinder. Without rotating the plug, back the actuator assembly off of the plug stem until there is 1/32-inch gap between the bottom of the yoke and bonnet. Then back the actuator assembly off of the plug stem exactly one complete turn. This provides the correct seating force.

3.13 Apply air below the actuator piston, retracting the plug. Install the yoke clamp. Replace the gland flange bolting and tighten the stem clamp nut.

3.14 To properly align the seat ring and plug, first bring the bonnet bolting to finger tightness. Apply air above the piston to seat the plug in the seat ring.

 **NOTE:** Step 3.14 applies only to valves with pneumatic actuators. If a hydraulic or mechanical actuator is used, return

the plug to the mid-stroke position and proceed to tighten.

3.19 Stroke the valve and check for smooth, trouble-free operation.



WARNING: Failure to return the plug to the mid-stroke position (mechanical or hydraulic actuators only) will cause damage to the actuator and/or the valve during the bonnet tightening sequence. This is due to the inability of most mechanical/hydraulic actuators to accommodate the 1/16-inch back driving during the tightening sequence.

3.15 With the plug in the extended (or closed) position, tighten two opposing bonnet flange nuts 1/6- turn (one flat). Tighten each bonnet bolt in this manner until the upper flange gaskets are compressed and the bonnet and bellows housing are seated metal-to-metal.

3.16 With the plug in the extended (or closed) position, tighten two opposing body nuts 1/6- turn (one flat). Tighten each bonnet bolt in this manner until the guide housing gaskets are compressed and the bellows housing and body are seated metal-to-metal.



CAUTION: Under-tightening may not fully compress the gaskets, which may cause leakage. Over-tightening may damage interior parts. Tighten only to the point that metal-to-metal seating occurs.

3.17 Remove air from the actuator. Adjust the positioner cam and stem clamp according to instructions contained in the appropriate positioner maintenance bulletin. Then adjust the stroke plate to indicate proper air-action (air-to-open valves should be adjusted so the stem clamp points to “closed” on the stroke plate; air-to-close valves should point to “open”).

3.18 Install the packing box bolting. Packing box bolting should be slightly more than finger tight when Teflon packing is used. Replace the tell-tale plug. Replace the anti-rotation warning tag.



CAUTION: Do not over-tighten packing. Over-tightened packing can cause high stem friction and excessive packing wear, which may impede stem movement.



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